

REMARKS

Claims 1-20 are now pending in this application. Claims 1-17 have been amended to define still more clearly what Applicant regards as his invention; these changes have been made for the purposes of clarification only, and no change in scope of the claims is either intended or believed to be effected by the changes. Claims 18-20 have been added. Claims 1 and 18-20 are independent.

The Formal Objections

Section headings have been added to the specification as requested by the Examiner. It is submitted that no new matter has been added.

Claims 2-5, 11, 13, 14, 16, and 17 were objected to for the informalities listed at paragraph 2 of the Office Action. These informalities have been corrected and, accordingly, withdrawal of this objection is respectfully requested.

The Prior Art Rejections

The Office Action sets forth the following prior art rejections:

- Claims 1, 6, 7, and 14 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 6,437,749 to Nagayama.
- Claims 1, 6, 7, 14, and 15 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 7,209,039 to Krebs.
- Claims 1, 6, and 7 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 5,365,242 to Shiina.
- Claims 1, 6, 7, 13, 14, 16, and 17 were rejected under 35 U.S.C. § 102(b) as being anticipated by Nagayama.
- Claims 1, 6-10, and 12 were rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent 6,661,391 to Ohara
- Claims 2-5 were rejected under 35 U.S.C. § 103(a) as being obvious from Nagayama.
- Claim 11 was rejected under 35 U.S.C. § 103(a) as being obvious from Shiina.

The present invention

The present invention relates to an antenna pattern for use in a television set, a cellular telephone, or the like. As described in the Background of the present application, conventional antennae, formed out of a solid wire, can suffer from lack of clarity in displayed images, or can fail to meet the demand for even clearer display images. The present invention can address these needs by providing an antenna pattern for obtaining a clearer display image, without any change on a background-art antenna pattern formed out of a solid wire, as explained in more detail in the present specification and below.

Claim 1 is directed to an antenna pattern in which a conductor wire forming the antenna pattern is formed out of an aggregated wire consisting of mesh or continuously polygonal micro-image element lines or an aggregated wire consisting of parallel element lines.

Thus, while antennae in the background art are formed out of a solid wire, the conductor wire of claim 1 is formed out of an aggregated wire consisting of mesh or contiguously polygonal micro-image element lines or parallel element lines. Figure 1 shows an example embodiment of the present invention in which reference numeral 1 represents an antenna pattern and reference numeral 2 represents a conductor wire. Fig. 2 is an enlarged reference diagram of a portion A in Fig. 1, showing an example where the aggregated wire consists of lattice-type mesh micro-image element lines. Thus, as can be seen from the figures, an aggregated wire (Fig. 2) is used instead of a solid wire. And in claim 1, an aggregated wire is claimed. The aggregated wire of claim 1 consists of mesh (Fig. 2), continuously polygonal micro-image element lines (such as triangles,

pentagons, hexagons, etc.) (Fig. 3), or parallel element lines (Fig. 4).¹

By virtue of the features of claim 1, the directivity of the conductor wire itself can be improved as a multi-directional wire in comparison with a solid conductor wire. A broadband characteristic can be also provided in accordance with the effective length of the conductor. Further, an effect as a noise filter can be obtained. Due to the expected improvement in performance, a background-art antenna itself can be miniaturized or a pattern image can be simplified when the conductor wire formed out of, for example, an aggregated wire or a parallel element wire according to the present invention, is used. It is therefore possible to supply an antenna which can support a UHF TV broadcast frequency band and a VHF TV broadcast frequency band satisfactorily, and which can be expected to have a clearer and more stable image than that in the background art.

Nothing in any of Nagayama, Krebs, Shiina, or Ohara would teach or suggest an antenna pattern in which a conductor wire forming the antenna pattern is formed out of an aggregated wire, as recited in claim 1. In contrast, all of these references discuss solid wires having a pattern.

¹It is of course to be understood that the references to various portions of the present application are by way of illustration and example only, and that the claims are not limited by the details shown in the portions referred to.

Nagayama

Nagayama, as understood by Applicant, relates to a glass antenna for a side windshield of an automotive vehicle. The Office Action states at page 5 that Nagayama discloses “in figure 1, an antenna pattern comprising a plurality of parallel conductive wires (3, 4) formed on a window glass G...” However, in Fig. 1 of Nagayama, the wires 3 and 4 are solid wires. They are not aggregated wires, as in claim 1. This is evident from Fig. 1 of Nagayama and its description, and from the fact that each wire has a width of 0.5 mm to 1 mm (see column 8, line 34, cited by the Examiner); but the fine wires in for example Fig. 2 of the present application that make up the aggregated wire are much smaller than that, on the order of, e.g., 20 μm (see, e.g., page 14, last line of the present specification). Furthermore, in Nagayama, the interval between each horizontal antenna element 4 is 35 mm (see column 8, lines 53-54); but the line pitch interval between the fine wires in Fig. 2 of the present application is on the order of, e.g., 100 μm (see, e.g., page 15, first line, of the present application). It is respectfully submitted that the Examiner is misunderstanding a notable feature of the claimed invention, particularly that an antenna pattern in which a conductor wire forming the antenna pattern is formed out of an aggregated wire.

Nothing in Nagayama would teach or suggest an antenna pattern in which a conductor wire forming the antenna pattern is formed out of an aggregated wire consisting of mesh or continuously polygonal micro-image element lines or parallel element lines, as recited in claim 1.

For at least the foregoing reasons, claim 1 is seen to be clearly allowable over Nagayama.

The rejection of dependent claims 2-5 for obviousness in view of Nagayama is also traversed on the basis of Examiner’s misunderstanding of the aggregate nature of the conductor wire in

claim 1. The Examiner states at page 7 of the Office Action that the specific dimensions of the parallel lines (conceded by the Examiner not to be disclosed in Nagayama) are considered “an obvious matter of design choice depending upon the desired characteristic of the antenna device.” However, this statement is merely conclusory, especially in view of the fact that the parallel lines of the claimed invention (width and pitch interval, on the order of μm) are much smaller than the wires of Nagayama, as explained above, and make up an aggregated wire. The conclusory statement by the Examiner does not support a finding of *prima facie* obviousness, because it does not establish that the features of claims 2-5 are taught or suggested by the prior art, as the law requires. Accordingly, claims 2-5 are seen to be clearly allowable over Nagayama.

Krebs

Krebs, as understood by Applicant, relates to a technique for printing an RFID antenna using conductive ink on a substrate and incorporating that substrate as a layer in a decorative surface such as a high pressure decorative laminate (see the abstract). The Examiner states at page 6 of the Office Action that Krebs “discloses, in figure 3C, an antenna pattern 18 comprising a plurality of parallel conductive wires formed on thin substrate 42...” However, the antenna wires 18 in Krebs are solid wires. They are not aggregated wires, as in claim 1. This is evident from the cited Fig. 3C of Krebs and its description, and from the fact that each wire has a line width of from .125 to 1 inches in the Examples provided in Krebs (see Examples 1-4 beginning at column 10); but the fine wires in for example Fig. 2 of the present application that make up the aggregated wire are much smaller than that, on the order of, e.g., 20 μm (see, e.g., page 14, last line of the present specification). Furthermore, in Krebs, the spacing between each antenna wire

18 is on the order of 0.5 inches (see reference numeral 80 of Fig. 5 designating the spacing and column 6, lines 44-48); but the line pitch interval between the fine wires in Fig. 2 of the present application is on the order of, e.g., 100 μm (see, e.g., page 15, first line, of the present application). It is respectfully submitted that the Examiner is misunderstanding a notable feature of the claimed invention, particularly that an antenna pattern in which a conductor wire forming the antenna pattern is formed out of an aggregated wire.

Nothing in Krebs would teach or suggest an antenna pattern in which a conductor wire forming the antenna pattern is formed out of an aggregated wire consisting of mesh or continuously polygonal micro-image element lines or parallel element lines, as recited in claim 1.

Shiina

Shiina, as understood by Applicant, relates to a glass antenna for a telephone of an automobile. The Examiner states at page 6 of the Office Action that Shiina “discloses, in figure 1, an antenna pattern comprising a plurality of conductive wires 3 formed on a window glass...” However, the conductive strips 3 in Shiina are solid wires. They are not aggregated wires, as in claim 1. This is evident from the cited Fig. 1 of Shiina and its description, and from the fact that each conductive strip 3 has a width that “is desirable to be 0.5 to 2 mm” in Shiina (see column 3, lines 41-45); but the fine wires in for example Fig. 2 of the present application that make up the aggregated wire are much smaller than that, on the order of, e.g., 20 μm (see, e.g., page 14, last line of the present specification). It is respectfully submitted that the Examiner is misunderstanding a notable feature of the claimed invention, particularly that an antenna pattern in which a conductor wire forming the antenna pattern is formed out of an aggregated wire.

Nothing in Shiina would teach or suggest an antenna pattern in which a conductor wire forming the antenna pattern is formed out of an aggregated wire consisting of mesh or continuously polygonal micro-image element lines or parallel element lines, as recited in claim 1.

Ohara

Ohara, as understood by Applicant, relates to an antenna and radio device comprising the same. The Examiner at page 6 of the Office Action states that Ohara “discloses, in figure 1, an antenna pattern comprising a plurality of parallel wires 12, wherein the antenna pattern is formed of a metal wire such as a copper alloy or a Cu, Ni-plated metal...” However, the parallel wires 12 in Ohara are solid wires. They are not aggregated wires, as in claim 1. It is respectfully submitted that the Examiner is misunderstanding a notable feature of the claimed invention.

Nothing in Ohara would teach or suggest an antenna pattern in which a conductor wire forming the antenna pattern is formed out of an aggregated wire consisting of mesh or continuously polygonal micro-image element lines or parallel element lines, as recited in claim 1.

New independent claims 18-20

Independent claims 18-20 recite features which are similar in many relevant respects to those discussed above in connection with claim 1. Accordingly, claims 18-20 are believed to be patentable for at least the same reasons as discussed above in connection with claim 1. These new claims also recite the specific features of a conductor wire being formed out of an aggregated wire of fine lines consisting of lattice-type mesh (claim 18), continuously polygonal micro-image element lines (claim 19) and parallel element lines (claim 20).

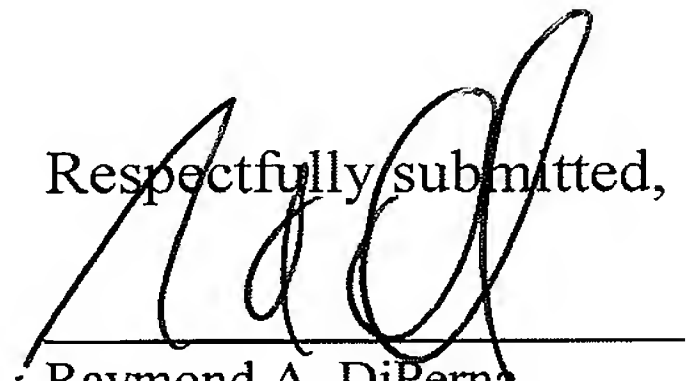
The other dependent claims

The other claims in this application are each dependent from independent claim 1 discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of each on its own merits is respectfully requested.

Conclusion

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Respectfully submitted,



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